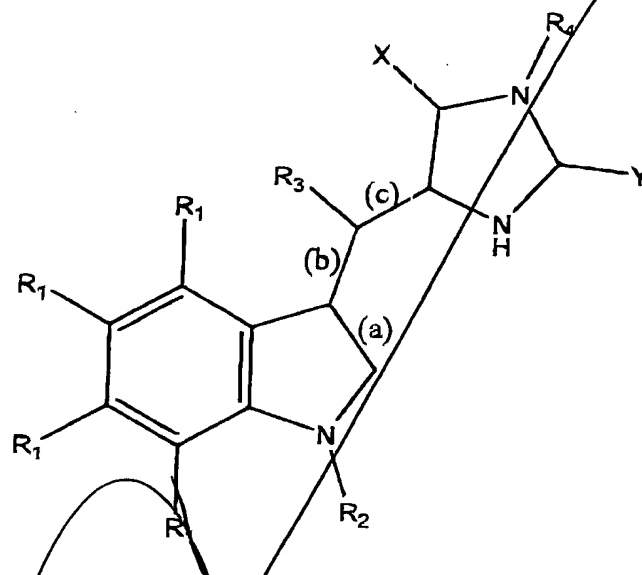


1. (Amended) A chemical compound having the formula:



wherein

each R_1 is independently selected from the group consisting of hydrogen, methyl, carboxy, hydroxyl, methoxyl, amino, and nitro;

R_2 is selected from the group consisting of hydrogen, alkyl, and acyl;

R_3 is selected from the group consisting of alkyl, acyl, halogen, hydrogen, or hydroxyl;

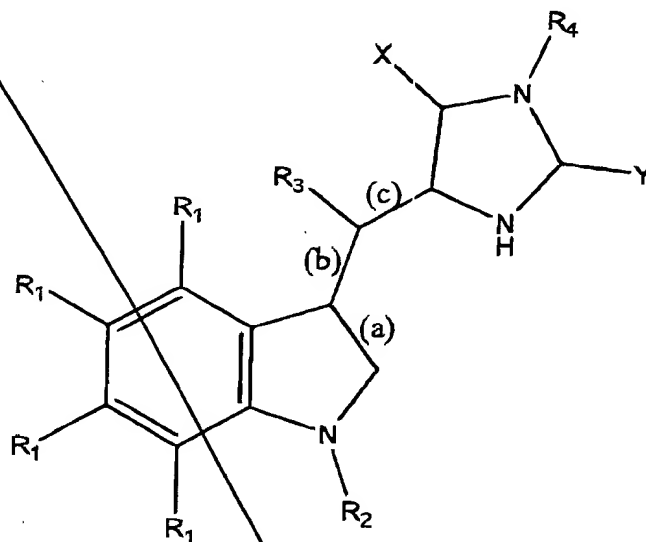
R_4 is selected from the group consisting of methyl, hydroxyl, carboxyl, and linear and branching alkyl groups;

X is selected from the group consisting of =O, -OH and -H;

Y is selected from the group consisting of =S and $-SR_5$, where R_5 is either hydrogen or an alkyl group; and

each of the bonds (a), (b), and (c) independently is either a double or single bond, provided, however, that bond (a) and bond (b) are not both double bonds.

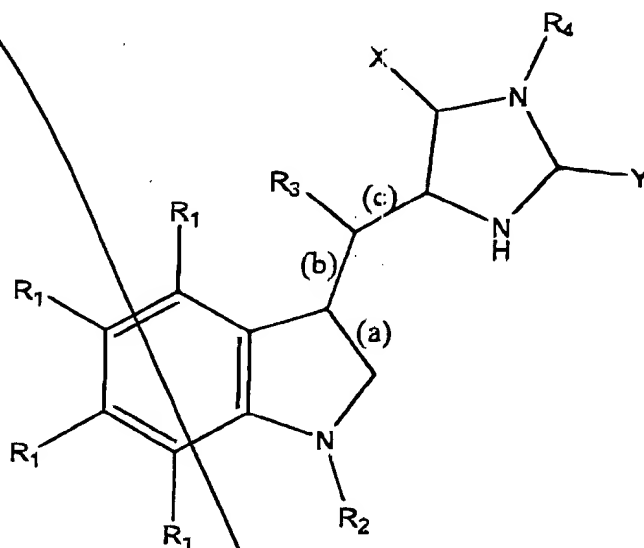
Subt C1
9. (Amended) A method for decreasing necrosis, said method comprising treating a cell with a chemical compound, said compound having the formula:



wherein

- each R_1 is independently selected from the group consisting of hydrogen, methyl, carboxy, hydroxyl, methoxyl, amino, and nitro;
- R_2 is selected from the group consisting of hydrogen, alkyl, and acyl;
- R_3 is selected from the group consisting of alkyl, acyl, halogen, hydrogen, or hydroxyl;
- R_4 is selected from the group consisting of methyl, hydroxyl, carboxyl, and linear and branching alkyl groups;
- X is selected from the group consisting of $=O$, $-OH$ and $-H$;
- Y is selected from the group consisting of $=S$ and $-SR_5$, where R_5 is either hydrogen or an alkyl group; and
- each of the bonds (a), (b), and (c) independently is either a double or single bond, provided, however, that bond (a) and bond (b) are not both double bonds.

24. (Amended) A method for treating a condition characterized by necrosis, in a patient, said method comprising the steps of administering a chemical compound having the formula:



to said subject, in a dosage sufficient to decrease necrosis, wherein

each R_1 is independently selected from the group consisting of hydrogen, methyl, carboxy, hydroxyl, methoxyl, amino, and nitro;

R_2 is selected from the group consisting of hydrogen, alkyl, and acyl;

R_3 is selected from the group consisting of alkyl, acyl, halogen, hydrogen, or hydroxyl;

R_4 is selected from the group consisting of methyl, hydroxyl, carboxyl, and linear and branching alkyl groups;

X is selected from the group consisting of =O, -OH and -H;

Y is selected from the group consisting of =S and -SR₅, where R₅ is either hydrogen or an alkyl group; and

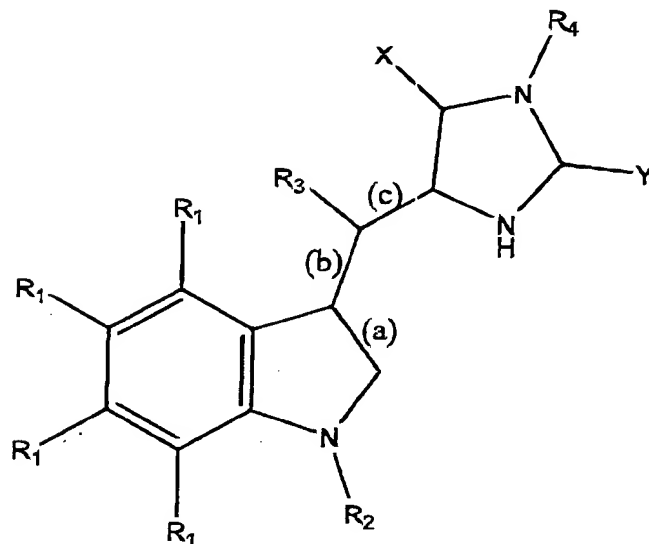
each of the bonds (a), (b), and (c) independently is either a double or single bond, provided, however, that bond (a) and bond (b) are not both double bonds.

b4 ¹⁵
~~33.~~ (Amended) The method of claim ¹⁴~~32~~, wherein said neurodegenerative disease is selected from the group consisting of Alzheimer's disease, Huntington's disease, cerebral ischemia, stroke, amyotrophic lateral sclerosis, multiple sclerosis, Lewy body disease, Menkes, disease, Wilson disease, Creutzfeldt-Jakob disease, and Fahr disease.

Subt
§ 5 C 3
~~41. (New) The method of claim 24, wherein said condition characterized by necrosis is a neurodegenerative disease, stroke, liver disease, pancreatic disease, ischemic brain injury, ischemic heart injury, ischemic injury to non-cardiac and non-neural tissue, head trauma, necrotic ulceration, septic shock, coronary heart disease, gastrointestinal disease, tuberculosis, viral infection, or conditions associated with HIV infection or AIDS.~~

Claims as Pending

1. (Amended) A chemical compound having the formula:



wherein

each R_1 is independently selected from the group consisting of hydrogen, methyl, carboxy, hydroxyl, methoxyl, amino, and nitro;

R_2 is selected from the group consisting of hydrogen, alkyl, and acyl;

R_3 is selected from the group consisting of alkyl, acyl, halogen, hydrogen, or hydroxyl;

R_4 is selected from the group consisting of methyl, hydroxyl, carboxyl, and linear and branching alkyl groups;

X is selected from the group consisting of =O, -OH and -H;

Y is selected from the group consisting of =S and -SR₅, where R₅ is either hydrogen or an alkyl group; and

each of the bonds (a), (b), and (c) independently is either a double or single bond, provided, however, that bond (a) and bond (b) are not both double bonds.

2. The compound of claim 1, wherein

each R_1 is hydrogen;

R_2 and R_3 are each hydrogen;

R_4 is a methyl group;

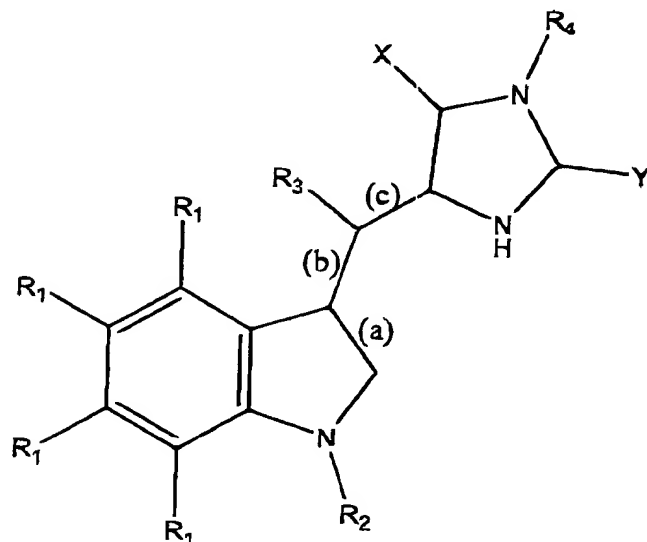
X is =O;

Y is =S;

bond (a) is a double bond; and

bonds (b) and (c) are each single bonds.

9. (Amended) A method for decreasing necrosis, said method comprising treating a cell with a chemical compound, said compound having the formula:



wherein

each R_1 is independently selected from the group consisting of hydrogen, methyl, carboxy, hydroxyl, methoxyl, amino, and nitro;

R_2 is selected from the group consisting of hydrogen, alkyl, and acyl;

R_3 is selected from the group consisting of alkyl, acyl, halogen, hydrogen, or hydroxyl;

R_4 is selected from the group consisting of methyl, hydroxyl, carboxyl, and linear and branching alkyl groups;

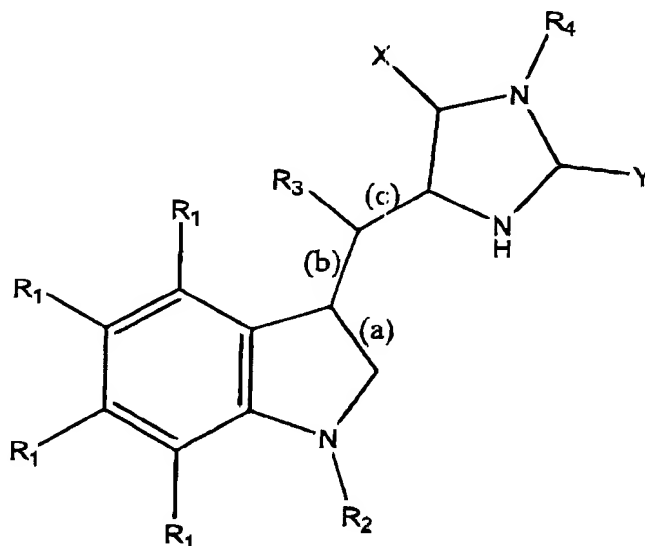
X is selected from the group consisting of =O, -OH and -H;

Y is selected from the group consisting of =S and -SR₅, where R₅ is either hydrogen or an alkyl group; and

each of the bonds (a), (b), and (c) independently is either a double or single bond, provided, however, that bond (a) and bond (b) are not both double bonds.

10. The method of claim 9, wherein in said compound
each R_1 is hydrogen;
 R_2 and R_3 are each hydrogen;
 R_4 is a methyl group;
 X is $=O$;
 Y is $=S$;
bond (a) is a double bond; and
bonds (b) and (c) are each single bonds.
17. (Amended) The method of claim 9, wherein said cell is capable of undergoing necrosis in the presence of zVAD-fmk and $TNF\alpha$.
18. (Amended) The method of claim 9, wherein said cell is capable of undergoing necrosis in the presence of zVAD-fmk and DMSO.
19. (Amended) The method of claim 9, wherein said cell is mammalian.
20. The method of claim 19, wherein said cell is human.
21. The method of claim 19, wherein said cell is a neuron.
22. The method of claim 19, wherein said cell is a rodent cell.
23. (Amended) The method of claim 9, wherein said compound is in a pharmaceutically acceptable carrier.

24. (Amended) A method for treating a condition characterized by necrosis, in a patient, said method comprising the steps of administering a chemical compound having the formula:



to said subject, in a dosage sufficient to decrease necrosis, wherein

each R_1 is independently selected from the group consisting of hydrogen, methyl, carboxy, hydroxyl, methoxyl, amino, and nitro;

R_2 is selected from the group consisting of hydrogen, alkyl, and acyl;

R_3 is selected from the group consisting of alkyl, acyl, halogen, hydrogen, or hydroxyl;

R_4 is selected from the group consisting of methyl, hydroxyl, carboxyl, and linear and branching alkyl groups;

X is selected from the group consisting of =O, -OH and -H;

Y is selected from the group consisting of =S and -SR₅, where R₅ is either hydrogen or an alkyl group; and

each of the bonds (a), (b), and (c) independently is either a double or single bond, provided, however, that bond (a) and bond (b) are not both double bonds.

25. The method of claim 24, wherein in said compound

each R_1 is hydrogen;

R_2 and R_3 are each hydrogen;

R_4 is a methyl group;

X is =O;

Y is =S;

bond (a) is a double bond; and

bonds (b) and (c) are each single bonds.

32. (Amended) The method of claim 24, wherein said condition is a neurodegenerative disease.

33. (Amended) The method of claim 32, wherein said neurodegenerative disease is selected from the group consisting of Alzheimer's disease, Huntington's disease, cerebral ischemia, stroke, amyotrophic lateral sclerosis, multiple sclerosis, Lewy body disease, Menkes, disease, Wilson disease, Creutzfeldt-Jakob disease, and Fahr disease.

34. (Amended) The method of claim 24, wherein said condition is selected from the group consisting of ischemic brain injury, ischemic heart injury, and head trauma.

35. (Amended) The method of claim 24, wherein said subject is a mammal.

36. The method of claim 35, wherein said subject is a human.

37. The method of claim 35, wherein said subject is a rodent.

41. (New) The method of claim 24, wherein said condition characterized by necrosis is a neurodegenerative disease, stroke, liver disease, pancreatic disease, ischemic brain injury, ischemic heart injury, ischemic injury to non-cardiac and non-neural tissue, head trauma, necrotic ulceration, septic shock, coronary heart disease, gastrointestinal disease, tuberculosis, viral infection, or conditions associated with HIV infection or AIDS.